

Natural Language Auto-Responder Technology for Mission Outreach

Joel Wilf

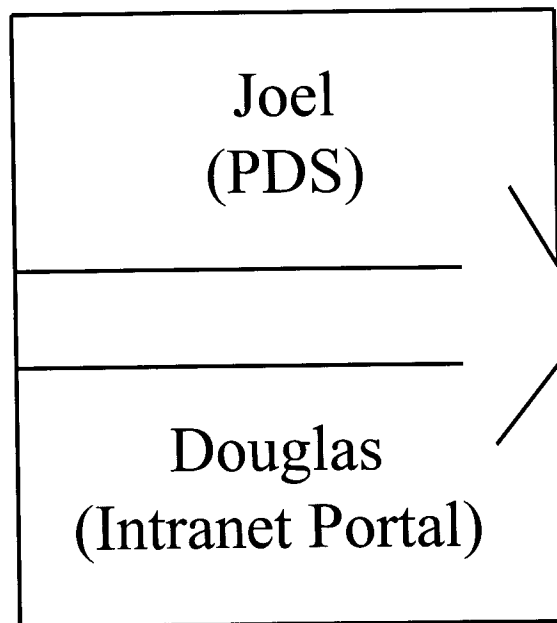
Section 382

Douglas Hughes

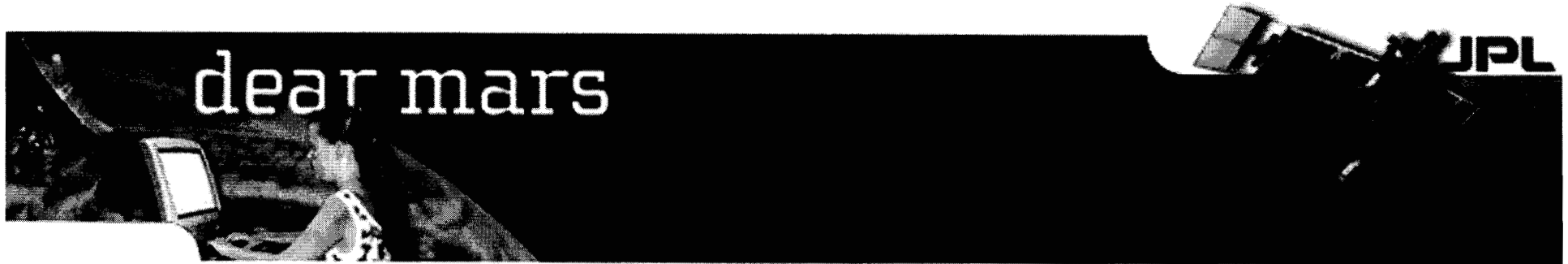
Section 381



In the beginning (March 2000)

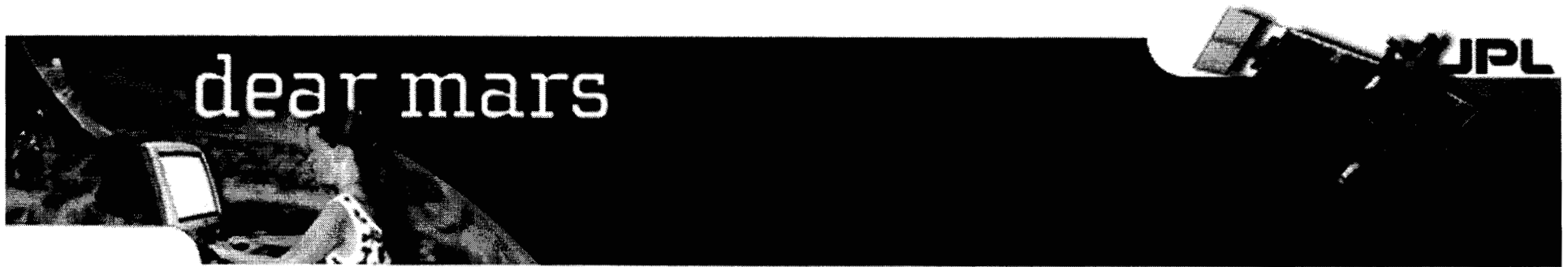


*“Wouldn’t it be cool if
you could send an e-mail
to Mars and get an
answer?”*



First refinement of the idea

- This is part of an education and outreach program about a JPL Mars mission, targeted at K-12 schools
- Student selected from participating school
- Student writes and sends an e-mail to the spacecraft and gets a reply - a one-time, historic event



Others refined the idea

- The e-mail handler would have to be a “fly on the elephant”
- Software-only implementation
- Do real natural language analysis, built on existing AI technology
- Create a ground-based server for public access first



Natural Language Auto-responder

- Rich Doyle introduced us to Boris Katz at MIT AI Lab and the START system

<http://www.ai.mit.edu/projects/infolab/>

- **What is START?**

- START (SynTactic Analysis using Reversible Transformations) provides multimedia information access using natural language.
- **Natural language**
 - START lets you use *human* language instead of a special computer language.

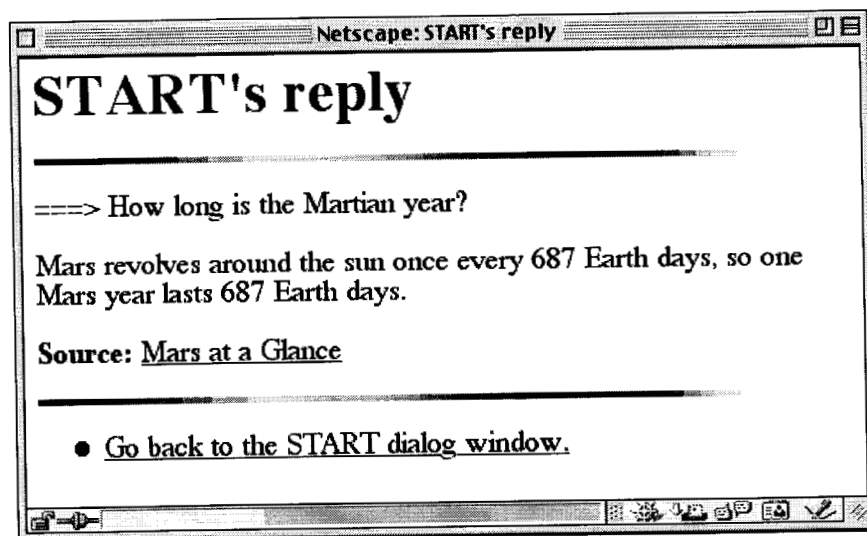


Natural Language Auto-responder

- **What is START?** *...continued*
 - **Multimedia access**
 - START lets you access *any* kind of information: text, pictures, movies, and more.
 - **“Just the right information”**
 - START gives you the answer you want without including a thousand other answers.
 - **Universal access**
 - START retrieves information from its own knowledge base and from all over the Web.



Natural Language Auto-responder



CSMISS (Pat Liggett) provided funding to train the START system to answer questions about Mars for Mars Outreach for an JPL Open House demo and to explore interfacing with PDS and OODT.

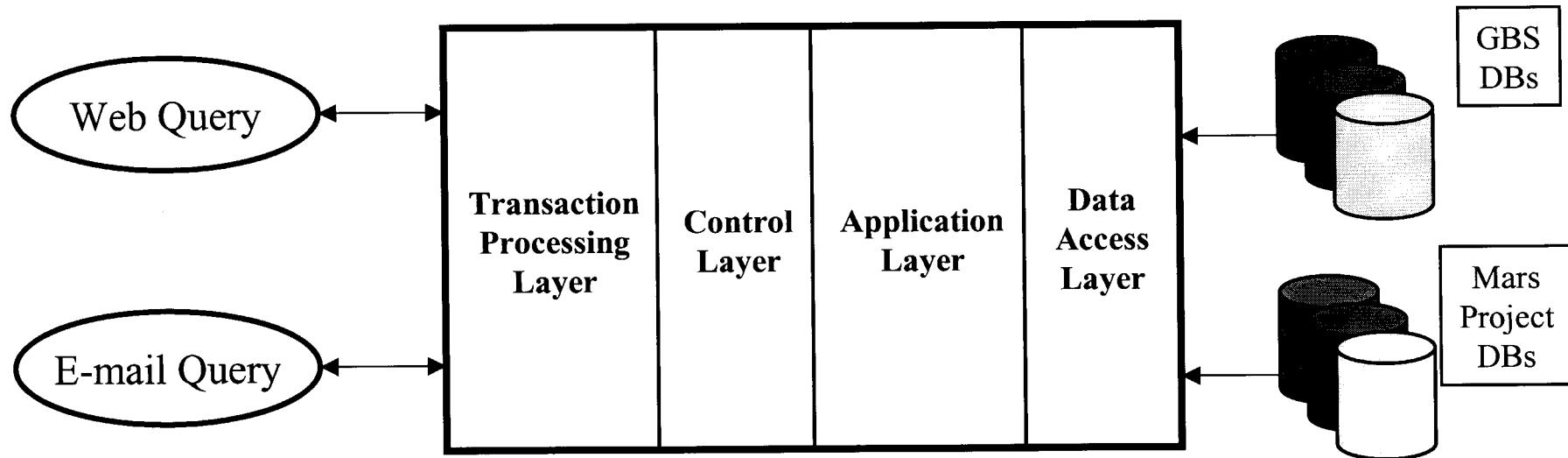


High-level System Requirements

- The system shall support the Mars Outreach Office by providing a publicly-accessible, automated interface for the query, retrieval and distribution of JPL Mars mission domain knowledge.
- The public user shall access the system via e-mail and/or a Web browser.
- The system shall augment Outreach efforts as an integrated part of the Outreach plan.



Context Diagram





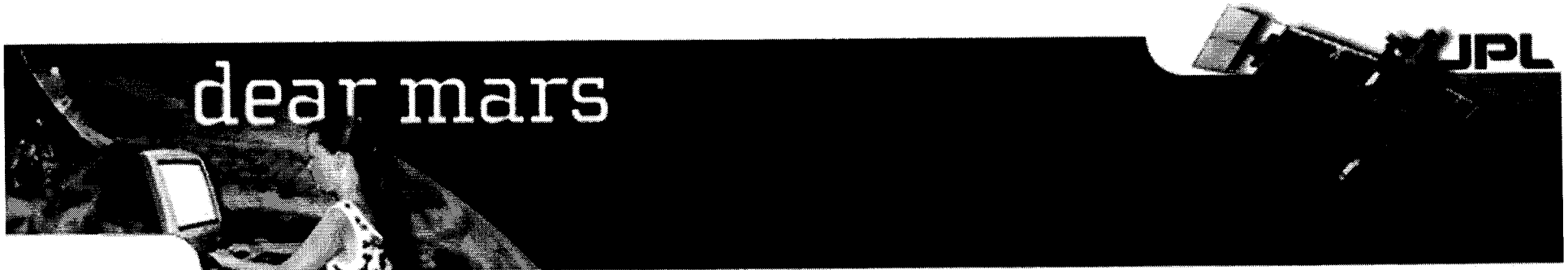
High-level Data Flow

- **Future** E-mail Subsystem
 - (1) & (3) E-mail is filtered for Unsolicited Bulk E-mail (UBE) - No Spam!
 - (2) E-mail is received by e-mail server
 - (4) E-mail is analyzed by parser and saved in database along with metadata
 - Sender
 - From
 - Subject
 - Question(s)

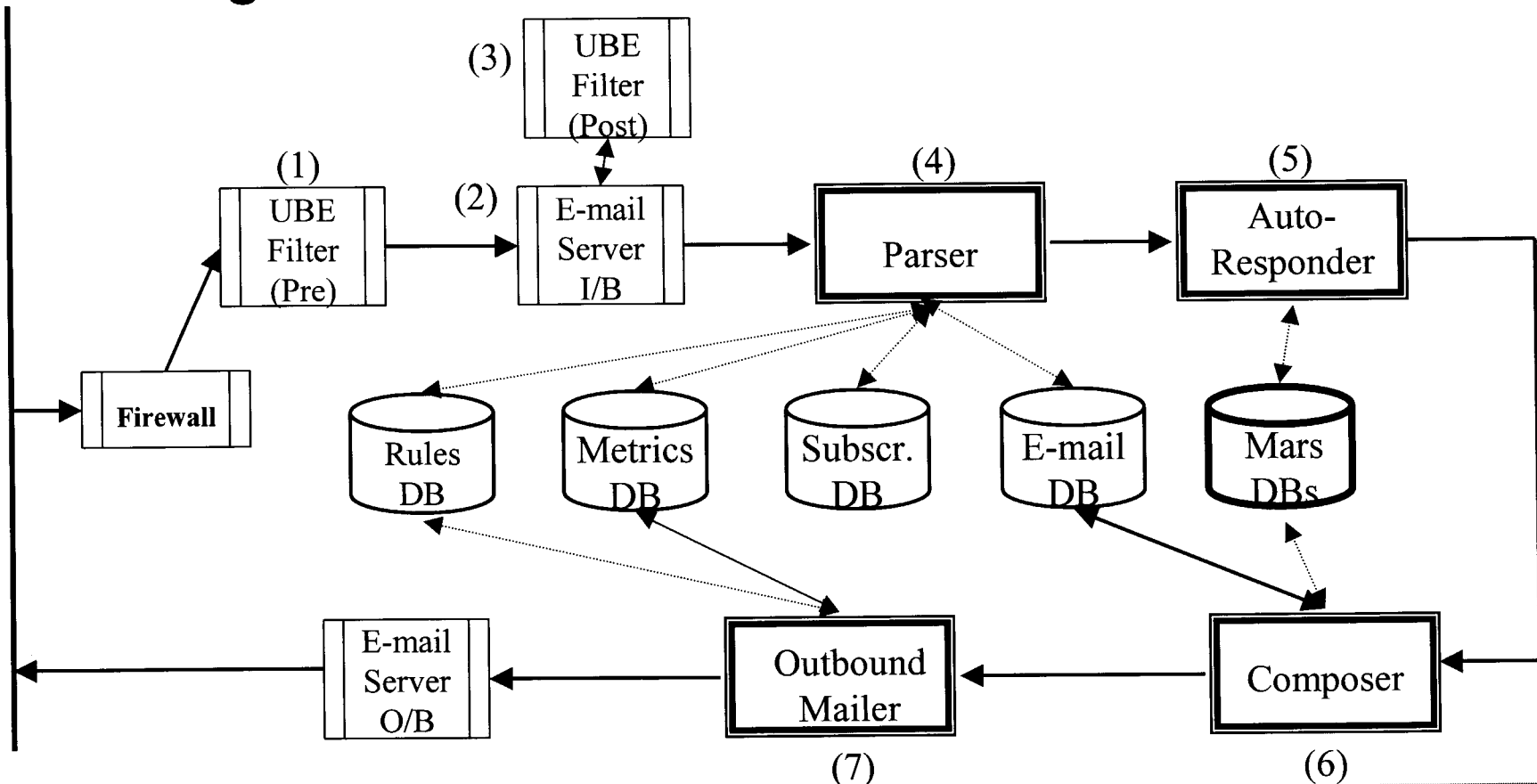


High-level Data Flow

- **Future** E-mail Subsystem *...continued*
 - (5) Question(s) submitted to Auto-responder
 - (6) Composer formulates complete response
 - (7) Outbound mailer sends return e-mail



High-level Flow Future E-mail Subsystem





Future E-mail Interface

Status:
X-Sender: DearMars@pop.jpl.nasa.gov
Date: Fri, 27 Apr 2001 12:58:49 -0700
To: "Billie Jenkins" <bjenkins@edumanet.edu>
From: "Dear Mars" <DearMars@jpl.nasa.gov>
Subject: Re: Mars question

Hello Billie,

The average diameter of Mars is 6,780 kilometers. That's a little over 4,203 miles. Just for comparison, the equatorial diameter of Earth is 7,926 miles (12,760 kilometers) and the polar diameter 7,900 miles (12,720 kilometers).

For an overview of Mars, visit the JPL Mars Exploration Web Site at <http://mars.jpl.nasa.gov/facts/ataglance.html>.

Thank you for your interest in JPL and Mars. Don't forget to visit our Web site at <http://dearmars.jpl.nasa.gov> and ask more great questions about Mars exploration.

Regards,
Mars

P.S. If you would like to receive our free JPL Mars educational "Red Planet" e-zine via e-mail then send e-mail to RedPlanet@dearmars.jpl.nasa.gov with the following subject "subscribe RedPlanet" or simply visit <http://dearmars.jpl.nasa.gov/RedPlanet> and sign-up.

Dear Mars,

What is the diameter of Mars?

Regards,
Billie

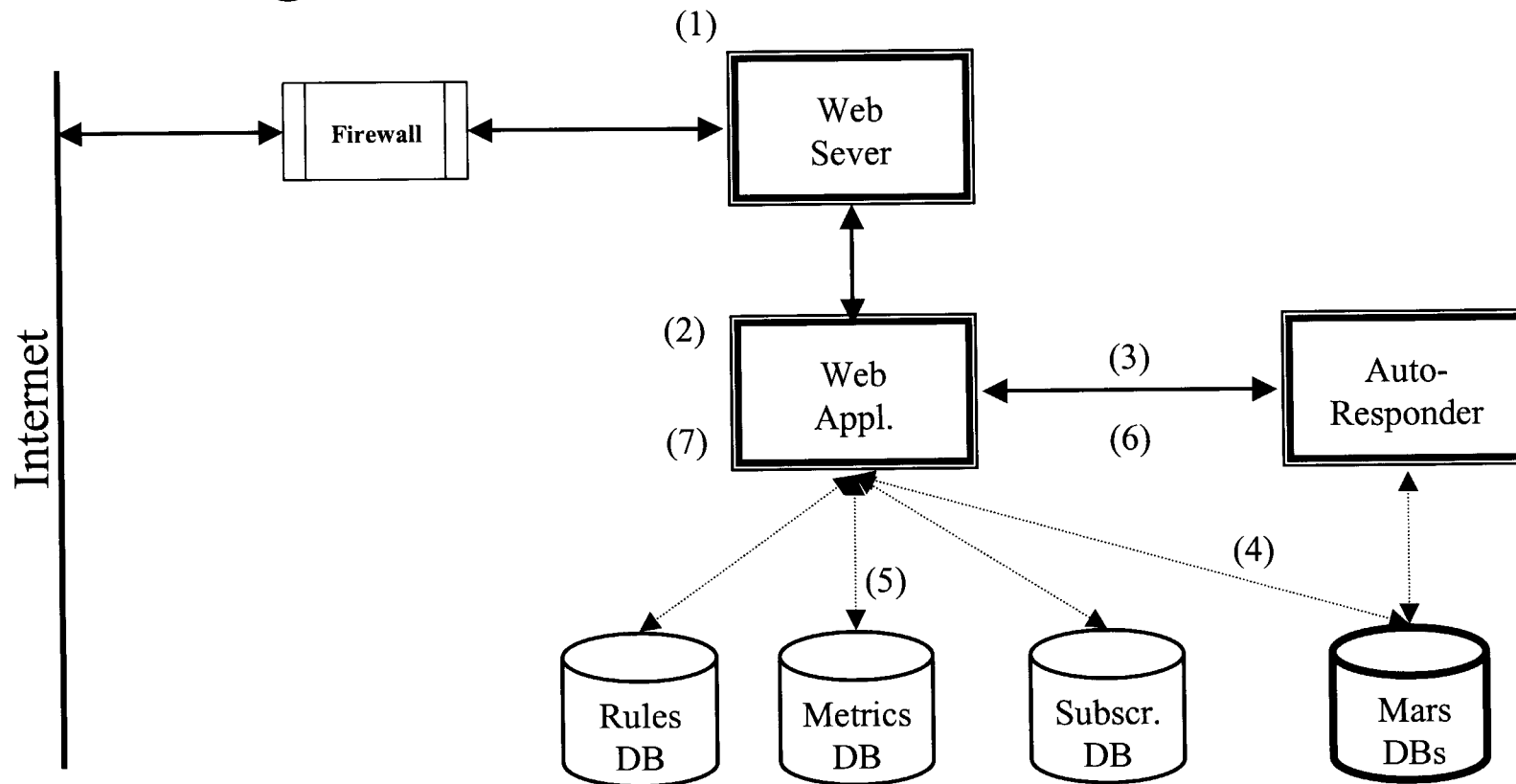


High-level Flow

- Web Site Subsystem
 - (1) User sets browser URL to GBS Web site URL
 - (2) Web server presents GBS home page
 - (3) User submits question to Web form
 - (4) Question is catalogued
 - (5) Metrics updated
 - (6) Auto-responder returns direct answer
 - (7) Page lists appropriate reference Web pages (URLs)



High-level Flow Web Site Subsystem

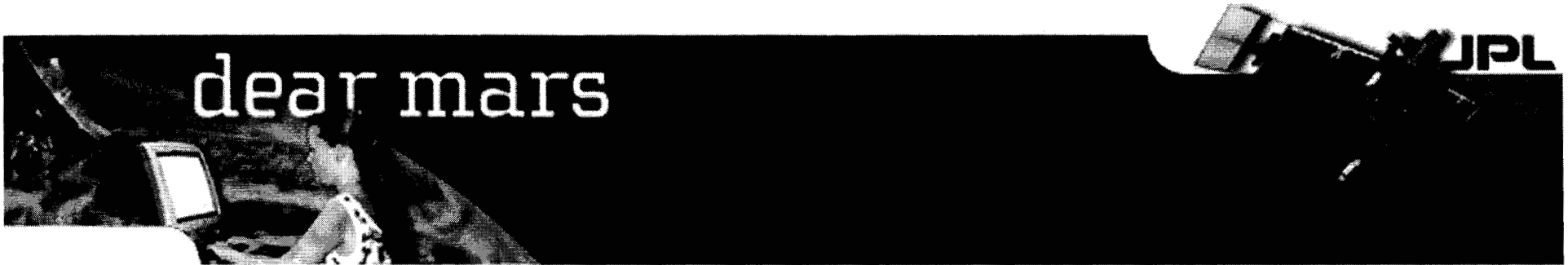




Web Site Interface

Check out the debut of the Dear Mars Web
site debuted at the JPL Open House:

<http://dearmars.jpl.nasa.gov/>



Next Steps

- Seek sponsorship to take the system development to the next level
- Cultivate use by Mars flight projects
 - E-mail to Mars and back!